Glenn T. Seaborg Center Seminar

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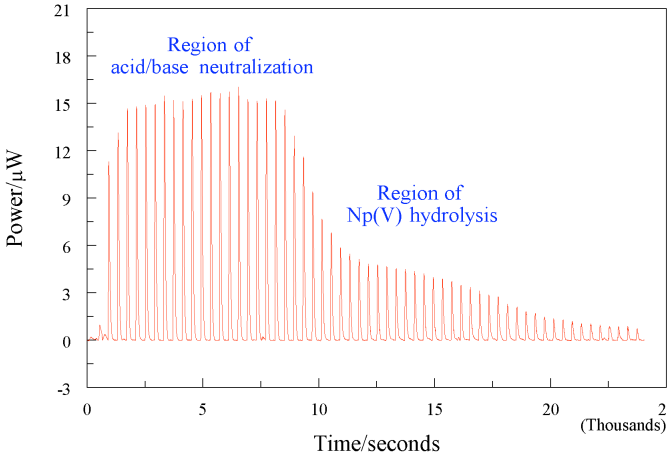
An Introduction to Titration Calorimetry: Applications to Thermodynamic Studies of Actinide Coordination in Solution

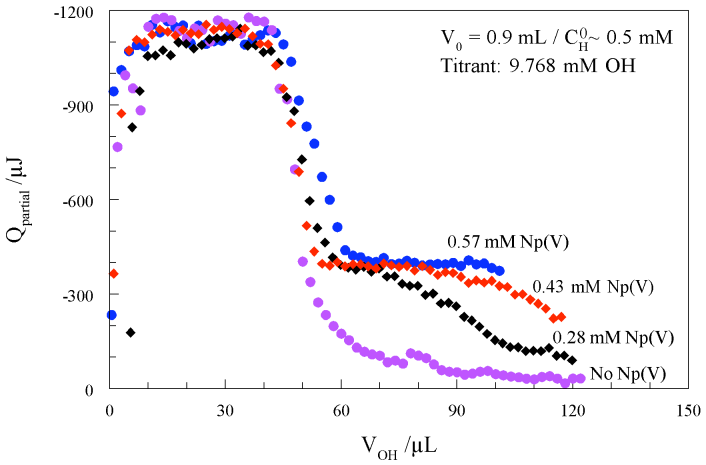
Wednesday, August 6, 2003
4 pm
Building 70A-3377

The Actinide Chemistry Group has three titration calorimeters dedicated to thermodynamic studies of actinide coordination in solution. The heat effects during a titration are accurately measured and used to obtain the enthalpy of complexation. Other thermodynamic parameters, including the entropy and the heat capacity of complexation, can be derived from the enthalpy measurements. These parameters provide insight into the energetics of complexation and the nature of the complexes, and help to estimate the effect of temperature on the complexation.

All the three calorimeters can be operated at variable temperatures (10 – 85 °C). The "micro" isothermal calorimeter has high sensitivity (microjoules) so that minimal amounts of materials are required for each titration. The two "conventional" isoperibol calorimeters are less sensitive (millijoules), but offer convenient and fast titrations.

Results from two studies, the hydrolysis of U(VI) and Np(V) at variable temperatures and the complexation of Eu(III) by diamides in non-aqueous solvents, are presented to demonstrate the applications of titration calorimetry.





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